POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longitude	Latitude	Spot	Group	
1928—Continued	h. m.	°	°	°			
July 31 (Naval Observatory).	11 42	−43.5	98.1	+7.5		170	
		−43.0	98.6	−14.5	3		
		−42.5	99.1	−25.0	31		
		−35.5	106.1	−15.5	46		
		−34.5	107.1	+13.0		15	
		−6.0	135.6	+14.0		370	
		+1.0	142.6	+13.0	370		
		+1.5	143.1	−20.0		31	
		+9.5	151.1	−20.0		37	
		+25.5	167.1	+7.0		37	
		+30.5	172.1	+7.0		62	
		+65.0	206.6	+13.5	108		1,280
Mean daily area for July							1,434

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR JULY, 1928

[Data furnished by Prof. A. Wolfer, University of Zurich, Switzerland]

July	Relative numbers	July	Relative numbers	July	Relative numbers
1	125	11	69	21	127
2	135	12	127	22	114
3	133	13	131	23	77
4	88	14	132	24	54
5	59	15	149	25	60
6	52	16	145	26	66
7		17	133	27	66
8	97	18	118	28	76
9	91	19	124	29	98
10	85	20	129	30	97
				31	105

Number of observations, 30; mean, 101.2.

AEROLOGICAL OBSERVATIONS

By W. R. STEVENS

Free-air temperatures for July were slightly below normal at Ellendale and Groesbeck, but were slightly above at the other kite stations.

There were no important departures from the normal relative humidity at levels where observations were frequent enough to give reliable monthly means.

Vapor pressures were quite generally above normal, except for the higher levels at Ellendale, Groesbeck, and Royal Center.

Wind resultants as determined from pilot balloons were almost entirely of southerly component near the surface, but at the majority of the stations shifted gradually to northerly component with altitude. The base of the antitrades was reached on a few occasions at San Juan, the altitude ranging between 5,000 and 9,000 meters. Easterly winds at high levels were observed at a number of stations in the Northwest from the 19th to the 25th. As is usual in conditions of this kind, there was a lack of cyclonic activity over that section. A double-theodolite pilot-balloon observation at Ellendale on the afternoon of the 12th showed fairly strong convectional currents from the surface to the point where it entered cumulus clouds at 1,400 meters. The highest vertical velocity observed was 3.2 m. p. s. between 750 meters and 1,100 meters. Another observation at the same station on the afternoon of the 27th showed an average vertical velocity of 2 m. p. s. from the surface to 1,715 meters where the balloon entered strato-cumulus clouds. The maximum vertical velocity was 2.9 m. p. s. between 1,250 and 1,600 meters.

The month was quite generally unfavorable for daily kite work. Flights at most stations were necessarily limited as to altitude and frequency because of light winds and the frequent occurrence of thunderstorms.

TABLE 1.—*Free-air temperatures, relative humidities and vapor pressures during July, 1928*

TEMPERATURE (°C.)

Altitude m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		Washington, D. C.[1] (7 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Meters												
Surface	27.4	+0.8	26.6	−0.5	21.3	+0.3	25.1	−1.5	25.1	+0.2	29.1	+4.3
250	27.2	+0.7	26.2	−0.5			24.4	−1.3	24.9	+0.3	25.9	+3.0
500	25.2	+0.3	23.8	−0.5	20.7	+0.1	23.2	−0.7	22.6	+0.5	24.2	+2.7
750	23.9	+0.4	22.7	+0.1	18.8	−0.4	22.6	−0.2	20.3	0.0	23.0	+2.6
1,000	23.3	+1.2	21.2	+0.3	17.3	−0.7	21.7	0.0	18.3	−0.2	21.3	+2.3
1,250	22.4	+1.8	19.5	+0.3	15.9	−1.0	20.5	0.0	16.5	−0.4	19.3	+1.8
1,500	21.0	+1.9	17.9	+0.3	14.7	−1.0	19.2	0.0	14.9	−0.5	17.3	+1.3
2,000	18.2	+2.1	14.8	+0.5	12.1	−0.9	16.4	−0.1	11.9	−0.6	13.3	+0.3
2,500	15.2	+2.2	11.7	+0.5	9.2	−0.9	13.1	−0.5	8.5	−1.3	10.4	+0.2
3,000	12.0	+2.2	8.8	+0.5	6.1	−1.1	10.0	−0.7	7.8	+0.7	8.8	+1.2
3,500	9.5	+2.6	5.9	+0.6	3.1	−1.2	6.8	−0.9	5.2	+0.9		
4,000	7.0	+3.1			0.4	−1.2	3.8	−0.9	2.5	+1.0		
4,500	4.3	+2.9			−2.6	−1.7	0.7	−2.1				

[1] Naval air station.

TABLE 1.—*Free-air temperatures, relative humidities and vapor pressures during July, 1928*—Continued

RELATIVE HUMIDITY (%)

Altitude m. s. l.	Broken Arrow, Okla. (233 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Groesbeck, Tex. (141 meters)		Royal Center, Ind. (225 meters)		Washington, D. C. (7 meters)	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Meters												
Surface	73	+4	72	+6	72	+3	84	+9	66	+4	67	−5
250	73	+4	73	+7			85	+9	66	+4	70	−3
500	74	+8	76	+8	72	+4	83	+6	65	+1	65	−4
750	71	+7	73	+4	70	+6	72	0	69	+3	61	−5
1,000	63	0	72	+2	70	+8	63	−4	71	+3	61	−4
1,250	57	−6	73	+2	70	+10	59	−5	72	+4	64	−2
1,500	57	−5	73	+2	68	+10	55	−7	68	+1	66	−1
2,000	53	−6	73	+2	59	+4	51	−8	61	−2	70	+2
2,500	51	−7	74	+4	57	+4	51	−7	60	+3	62	−4
3,000	55	−3	68	0	52	+1	46	−11	32	−19	35	−25
3,500	55	−2	69	+1	49	−1	40	−17	30	−18		
4,000	56	−1			41	−9	36	−24	28	−15		
4,500	60	+7			40	−10	36	−5				

VAPOR PRESSURE (*mb.*)

Surface	26.39	+2.36	24.94	+1.77	18.23	+1.12	26.51	+0.88	21.04	+1.55	27.05	+4.20
250	26.17	+2.35	24.68	+1.84			25.71	+0.96	20.75	+1.54	23.41	+2.84
500	23.63	+2.68	22.35	+1.97	17.66	+1.12	23.24	+0.76	18.01	+1.00	19.63	+1.79
750	21.13	+2.33	19.98	+1.30	15.34	+0.99	19.27	−0.37	16.68	+1.10	17.26	+1.26
1,000	18.05	+0.99	17.99	+0.76	13.91	+1.06	15.93	−1.07	15.16	+0.79	15.63	+1.15
1,250	15.33	−0.10	16.45	+0.60	12.64	+1.11	13.73	−1.28	13.45	+0.48	14.59	+1.31
1,500	13.91	+0.04	14.88	+0.56	11.22	+0.92	11.87	−1.60	11.38	−0.17	13.36	+1.08
2,000	10.76	−0.23	12.26	+0.58	8.21	−0.08	9.21	−1.74	8.11	−0.74	11.39	+1.20
2,500	8.54	−0.29	10.17	+0.79	6.41	−0.31	7.66	−1.35	5.90	−0.59	8.72	+0.50
3,000	7.51	+0.30	7.83	+0.26	4.87	−0.54	6.01	−1.58	3.06	−1.81	4.98	−1.25
3,500	6.35	+0.42	6.60	+0.38	3.94	−0.56	4.75	−1.66	2.06	−1.75		
4,000	5.88	+1.03			3.02	−0.70	4.04	−1.70	1.75	−1.07		
4,500	5.23	+1.43			2.63	−0.54	3.86	−0.22				